

## CALIFORNIA COASTAL COMMISSION

45 FREMONT, SUITE 2000  
SAN FRANCISCO, CA 94105-2219  
VOICE (415) 904-5200  
FAX (415) 904-5400  
TDD (415) 597-5885



## Managing Coastal Hazards

Managing coastal hazards is a key component of the coastal program. The Coastal Act aims to reduce risks to life and property and avoid substantial changes to natural landforms. As stated in §30253:

*New development shall:*

- 1) *Minimize risks to life and property in areas of high geologic flood, and fire hazard.*
- 2) *Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs.*

Engineered solutions to coastal hazards typically have significant impacts on coastal resources. In updating your LCP, keep in mind that the primary approach to hazards should be *avoidance*. Also remember that your LCP should clearly articulate that stability should be assured for the life of a development.

### ➤ ***What should an updated hazards section include?***

Similar to other policy areas, the hazards component of your LCP should reflect the geography of your jurisdiction. In order for new development to avoid hazards, your LCP should include current information, such as wave uprush studies, data on bluff retreat and beach erosions rates, and mapping or inventories of hazardous areas. Be sure to consider any changes since your last update so that designations of hazardous zones reflect actual conditions.

#### ◆ **Topics**

Hazard policies should direct the siting and design of new development so as to minimize risk to life and property and impacts to coastal resources. Typically, they will address the following issues (as applicable):

- ❑ Beach areas subject to seasonal or long-term erosion.
- ❑ Areas subject to high waves, such as those from storms, surges and seiches.
- ❑ Coastal or riverine flood hazards.
- ❑ Tsunami inundation runup areas.
- ❑ Sea level rise, from both a short and long term perspective.
- ❑ Beach nourishment/sand supply for beaches vulnerable to wave damage and erosion.

*The complete text of the California Coastal Act is available at the Coastal Commission's website—[http://www.coastal.ca.gov/coa\\_stact.pdf](http://www.coastal.ca.gov/coa_stact.pdf). You'll find policies about coastal resources planning and management in Chapter 3.*

- ❑ Restricting future armoring for new development. Geologic hazards, like bluff and cliff instabilities.
- ❑ Landslide hazard areas.
- ❑ Expansive or highly corrosive soils.
- ❑ Subsidence areas.
- ❑ Grading and vegetation clearance on steep slopes.
- ❑ Fire hazard areas.
- ❑ Seismic hazard areas.
- ❑ Areas of potential liquefaction.

#### ◆ Definitions

Your LCP should include clear definitions. Certain terms, like coastal bluff and bluff edge must be defined in the LCP and conform to the California Code of Regulations (see box). Bluff must also be defined, although the regulations do not currently provide one. Other definitions helpful when updating hazards policies include beach, coastal bluff, cliff, sea cliff, infill, and economic life. The Newport Beach LCP glossary contains good examples of such definitions: <http://www.city.newport-beach.ca.us/Pln/LCP/LCP.htm>.

*The California Code of Regulations, Title 14, Division 5.5, Chapter 8, Subchapter 2, (LCPs & LRDPs) can be found at*  
<http://government.westlaw.com/linkedslide/default.asp?SP=CCR-1000>

One of the few opportunities to improve hazard reduction for existing development is immediately after that development is damaged or destroyed by hazardous conditions. LCP permit requirements for development damaged or destroyed by natural disasters should enable repairs and development replacements that maximize hazard avoidance and conformance with current hazard requirements.

#### ➤ ***What are some important issues in hazards management?***

##### ◆ Setbacks

A critical element of every LCP is the designation of appropriate review and setback criteria for bluff, cliff, and beach level development. You should ensure that the proposed land division of coastal fronting property that creates hazardous parcels is not allowed. New parcels should only be created if they can be developed without ever requiring shoreline protection for the development. Your LCP should prohibit land divisions that will result in parcels that are unbuildable.

For cliff and bluff-top development, your LCP should require a setback for structures built on shallow foundations that assures that it will be stable for its economic life. The relative stability of a slope can be calculated quantitatively by a slope stability analysis, in which the forces tending to resist a potential landslide are divided by the forces tending to drive a potential landslide. The industry standard for a “stable” site is that this quotient, called a factor of safety, be at least 1.5 in the static condition, and 1.1 to 1.2 under seismic

*Planning for Tsunamis*

- *Update hazards maps.*
- *Avoid developing in hazardous areas.*
- *If avoidance is impossible, use low impact engineering techniques, such as elevating structures.*
- *Site critical facilities outside of the hazardous zone.*
- *Keep policies current and based on the latest science.*

conditions. The factor of safety generally increases with distance from the bluff edge, so the point at which the factor of safety reaches 1.5 constitutes a minimum setback for existing conditions. Because coastal bluffs are steadily retreating, however, in order to assure that the site will still have a 1.5 factor of safety at the end of its economic life, the amount of bluff retreat expected over its life must be added to the initial setback.

Your LCP should require a site analysis for bluff-top development to determine the present-day setback needed to achieve a factor of safety of 1.5. To find the total setback needed, add to that figure the predicted bluff retreat for the expected life of the project, such as 100 years of bluff erosion. The Coastal Commission's staff geologist presented a memo on the topic to the Coastal Commission (<http://www.coastal.ca.gov/W-11.5-2mm3.pdf>) and published a paper called *Establishing Development Setbacks from Coastal Bluffs* (<http://www.pubs.asce.org/WWWdisplay.cgi?0414121>).

Setbacks are also important for developed cliff and bluff top lots since new development such as additions, partial tear-downs and rebuilds are often proposed subsequent to site development. Such new development could be proposed for locations closer to the bluff than the existing development, at the same distance as the existing development, or further than the existing development. The LCP should account for these various scenarios where both existing protective structures currently exist and where they do not. While existing development is eligible to be considered for protective structures, the LCP should ensure that an addition or remodel does not 1) accelerate the need for a shoreline structure (e.g., the addition should not be further seaward than the existing structure) or 2) increase the likelihood of a future seawall beyond the existing development's expected life (e.g., the existing structure is within the bluff top setback and nearing the end of its expected life and the addition is substantial and at the same location). Also, LCP non-conforming provisions should not contradict such setback provisions.

Setback policies for new development at beach level are also critical. For such development, your LCP should require wave uprush studies and provide guidelines for siting new development. At a minimum, the wave up-rush studies should consider the consequences of a low-probability wave event (such as the 1% annual probability. Also known as the 1 in 100 year event) with the following beach and water conditions:

- Seasonally eroded beach with long-term erosion comparable to what could be expected to occur over the life of the proposed development.
- High tide combined with the increase in mean sea level expected to occur over the life of the proposed development.

Development should be sited to avoid the zone of wave run-up. If complete avoidance is not practical, avoidance should be maximized and development should be designed, through features such as elevation, to protect against the consequences of unavoidable hazards. However, development that is so hazardous that it may constitute a public nuisance should not be allowed. You

can also consider providing incentives for locating development away from hazardous coastal areas.

#### ◆ **Natural Disasters**

Historically, LCP policies have not adequately addressed hazards caused by certain natural disasters. These include winter storm events (especially those caused by an El Niño conditions), tsunamis, earthquakes, and landslides. It is important to realize that during the last 20 years, much more information and science has become available. You should look to recent scientific research as knowledge about coastal hazards is continually evolving. For example:

- The California Geological Survey routinely updates maps of seismic hazards,
- The Governor's Office of Emergency Services (OES) regularly updates its State Multi Hazard Plan,
- OES has worked with NOAA to improve tsunami inundation and run-up maps and provide better information on tsunami preparedness,
- The National Weather Service has developed a Tsunami Ready program to help communities plan for a tsunami,
- Many agencies are working to improve our ocean observing systems and provide better information on oceanic and weather conditions, and
- FEMA is updating the coastal flood maps.

#### ◆ **Sediment Supply**

Loss of sediment/sand supply to the beach and the nearshore environment has multiple deleterious effects.

- 1) Hazards are increased because of increased erosion and subsequent damage from waves,
- 2) Coastal recreation opportunities are decreased (see Section 1: Public Access), and
- 3) Armoring becomes necessary in places not needed before (see Section 9: Shoreline Erosion and Protective Structures).

Consider including language in your LCP to advance a regional management approach to sediment supply, one that accepts the value of beaches and works to improve them. An LCP can identify local involvement in regional opportunity (see box). Your LCP can also look at the level of armoring in your community and identify ways to mitigate impacts to sand supply, public access, and recreation.

#### ➤ ***Where can I read some good examples of LCP hazards policies?***

Two recently updated LCPs provide some good examples of hazards policies, ordinances, and definitions:

*The California Coastal Sediment Management Workgroup facilitates regional approaches to protecting, enhancing and restoring California's coastal beaches and watersheds through federal, state and local cooperative efforts. Read about it at <http://www.dbw.ca.gov/csmw/csmwhome.htm>.*

- ❑ The City Of Malibu at <http://www.ci.malibu.ca.us/index.cfm?fuseaction=detailgroup&navid=204&cid=1576>, and
- ❑ The City of Newport Beach at <http://www.city.newport-beach.ca.us/Pln/LCP/Internet%20PDFs/CLUP%20Part%203.pdf>.

➤ ***What are some new directions in hazards management?***

◆ **No Adverse Impact (NAI) Floodplain Management**

NOAA's Coastal Services Center recently released the final draft of *The Coastal No Adverse Impacts Handbook*, put together by the Association of State Floodplain Managers (ASFPM). As they define it, NAI flood management is where the action of one property owner does not adversely impact the rights of other property owners, as measured by increased flood peaks, flood stage, flood velocity, and erosion and sedimentation. ASFPM developed a toolkit of ways that communities could go beyond the basic FEMA recommendations for flood plain management to apply the NOI approach. For more information on NOI, visit <http://www.floods.org/home/default.asp>.

◆ **Multi-Hazard Approach**

FEMA is now promoting an “all hazards approach” for hazards management. Rather than planning for each type of hazard separately, this approach looks at the whole environment, recognizes the positives and negative aspects of where to build, and then considers ways to mitigate for the various hazards. Community resilience is being emphasized. FEMA has published the *State and Local Guide 101: Guide for All-Hazard Emergency Operations Planning* (<http://www.fema.gov/plan/gaheop.shtm>).